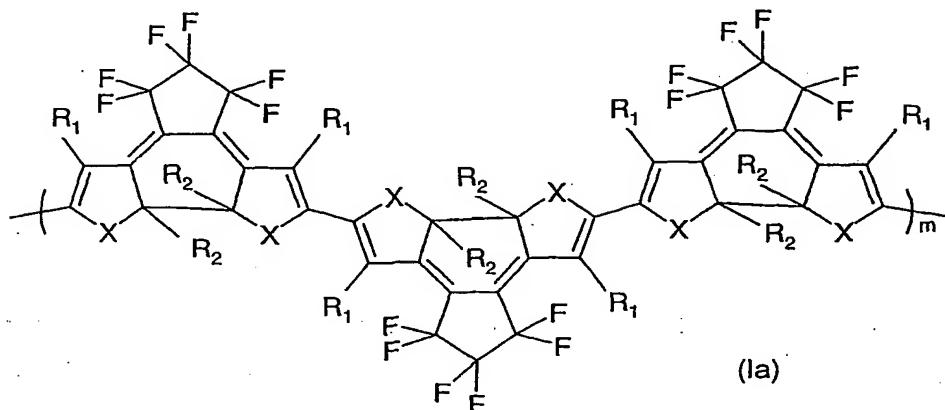


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### CLAIMS

- 1) An optical waveguide comprising a matrix and an optical path including a photochromic diarylethene polymer having the general formula (Ia)



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wherein

X is S, O, Se, Te, or N-R, wherein R is hydrogen or a linear or branched (C<sub>1-12</sub>)alkyl group;

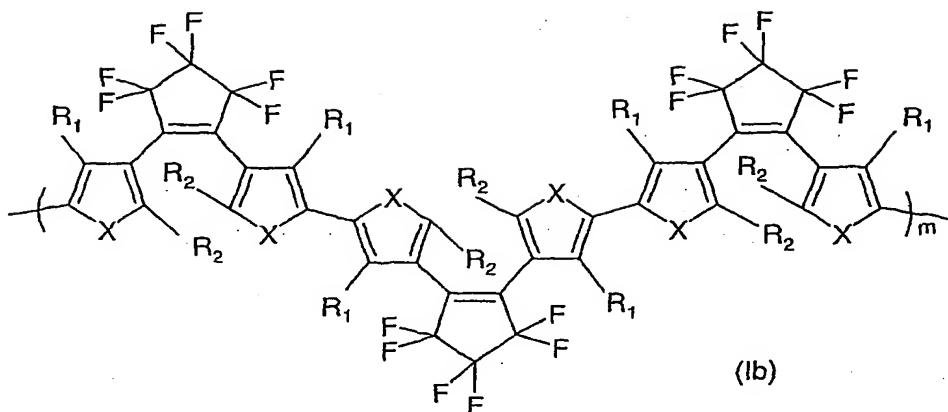
10 R<sub>1</sub> is hydrogen, a linear or branched (C<sub>1-12</sub>)alkyl or (C<sub>1-12</sub>)alkoxy group;

R<sub>2</sub> is a linear or branched (C<sub>1-12</sub>)alkyl group; and

m = 4-100.

- 2) An optical waveguide according to claim 1 wherein X is S, Se or Te.
- 15 3) An optical waveguide according to claim 2 wherein X is S.
- 4) An optical waveguide according to claim 1 wherein R<sub>1</sub> is hydrogen or a (C<sub>1-3</sub>)alkyl group.
- 20 5) An optical waveguide according to claim 1 wherein the optical path is surrounded by a matrix comprising a photochromic diarylethene polymer having the general formula (Ib)

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wherein X, R<sub>1</sub>, R<sub>2</sub> and m are according to any of the preceding claims.

- 6) An optical waveguide according to claim 1 wherein said photochromic diarylethene polymer is dispersed in said matrix.
- 7) An optical waveguide according to claim 1 wherein said matrix is selected from polystyrene, polymethylmethacrylate (PMMA), polycarbonate, polysulphone, polyimide, fluorinated or deuterated PMMA, and mixtures thereof
- 8) Method for the preparation of an optical waveguide comprising the steps of
  - a) dissolving a photochromic diarylethene polymer of formula (Ib) as from the preceding claims, in an organic solvent;
  - b) mixing the thus obtained solution and a polymeric matrix until a dispersion is obtained;
  - c) preparing a film by depositing said dispersion on a substrate;
  - d) irradiating said film, so as to form an optical path comprising a photochromic diarylethene polymer of formula (Ia) as from the preceding claims.
- 9) Method according to claim 8 wherein the organic solvent is a chlorinated solvent.
- 10) Method according to claim 8 wherein the photochromic diarylethene polymer of the invention is dissolved in said matrix at a con-

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centration not higher than 20% by weight.

- 11) Method according to claim 10 wherein said concentration ranges between 0.1% and 15% by weight.
- 12) Method according to claim 11 wherein the concentration ranges between about 5 and about 10% by weight.  
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